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- (21) Application No. 61981/70 (22) Filed 31 Dec. 1970  
 (23) Complete Specification filed 29 Dec. 1971  
 (44) Complete Specification published 10 July 1974  
 (51) International Classification F16B 2/10 E05D 3/02 F16C 11/04  
 (52) Index at acceptance  
       E2B 4C1B1  
       E2F 1Q1 3M2 3R

(19)



## (54) IMPROVEMENTS IN CLAMPS AND HINGES

(71) I, FERGUS O'FARRELL, a citizen of the Republic of Ireland, of 24 Duke Street, Dublin 2, Republic of Ireland, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a clamping device and is particularly concerned with clamping devices which will facilitate the mounting of panel elements, for example for display or partitioning purposes, and the subsequent dismounting of such elements. Known clamps for this purpose are generally of a type in which a clamping action is obtained by screw-closure of the jaws of the clamp, and the operation of such clamps tends to be slow. It is an object of the present invention to provide a clamp which may be opened or closed by a single, quick-action, movement, and which is particularly suitable for clamping panel elements in pivotal relation.

The invention provides a clamping device comprising two clamping members each comprising two opposed limbs connected together at one end thereof by a stock portion and spaced apart to define a slot into which an article to be clamped may be inserted, a cam or eccentric rotatably mounted in one limb and adapted when the clamp is in a closed position to protrude into the slot to grip the article to be clamped, and wherein the two clamping members are pivotally connected together at the stock portions thereof. In one embodiment the two clamping members are pivoted about a pintle having its axis parallel to the axis of rotation of each cam or eccentric. The pintle may be hollow to enable a plurality of clamping devices and members to be pivotally connected together in stacked arrangement by means of a common pin inserted through the hollow pintles. In another embodiment the two clamping members are pivoted about a dowel pin, bolt or screw having its longitudinal axis arranged perpendicular to the

pivotal axis of each cam or eccentric. Preferably, the acting-face or edge of the cam or eccentric has a gripping region which is furthest from the axis of rotation of the cam or eccentric, and the cam or eccentric is rotatable from a clamping position in which the gripping region protrudes into the slot to an open position where the gripping region is retracted from the slot without the cam or eccentric passing overcenter. The cam or eccentric should be so designed, and mounted in the limb, that the rotation thereof, preferably through an angle of 180° or less, brings the gripping region of the acting-face or edge from an open position where it is retracted from the slot, through a position where the acting-face or edge bears gradually upon the surface of the article to be clamped, to a closed position where the gripping region presses upon and grips the article to be clamped.

The cam may consist of a cylindrical block eccentrically journaled above an aperture in the face of the limb. A short handle or lever may be attached to the block on the side remote from the gripping region thereof so as to enable the cam to be readily turned one way or the other by the finger. Preferably, the gripping region consists of an axially extending substantially flat surface formed on the face of the cylindrical block. To attach a clamping member to a panel, a marginal portion of the panel is inserted into the slot between the limbs of the member, the cam being first turned into an open position such that the gripping region lies outside, and does not obstruct, the slot. The panel may be firmly gripped by partially turning the cylindrical cam, for example through an angle of 180°, to cause the gripping region of the cam to protrude into the slot and to press upon the adjacent surface of the panel. In this way the panel is gripped between the gripping region of the cam and the inner face of the opposite limb without the cam passing overcenter.

One application of the invention concerns the provision of hinges which may be easily

[Price 25p]

and quickly applied to elements to be connected. Hinges are normally employed to provide a pivotal attachment between two structural elements and comprise essentially a pair of straps or butts for connection to the respective structural elements, the straps or butts having a common pivot pin or pintle which passes through a knuckle portion of the hinge. In one embodiment of the invention the strap portions of a hinge each consist of a clamping member according to the invention. Preferably the two clamping members are connected end to end in knuckle-like engagement with a common pintle. Such hinges may advantageously be used for the quick assembly of panels to each other with freedom of relative hinging movement.

Some embodiment of the invention will now be described with reference to the accompanying drawing, wherein:—

Figure 1 is a side elevation of a clamping member according to the invention;

Figure 2 is a plan view of the clamping member of Figure 1;

Figure 3 is a side elevation of a clamping device according to the invention;

Figure 4 is a plan view of the underside of the device of Figure 3;

Figure 5 is a plan view, partly in section, of a plurality of clamps in stacked hinged relation; and

Figure 6 is a side elevation of a clamp and footpiece.

Referring to Figures 1 and 2, a clamping member comprises two opposed limbs 1 and 2 spaced apart to define a slot 3. The limbs 1 and 2 are connected together at one end to form a stock portion 4. Limb 1 is provided with two upwardly-extending part-circular flanges 5 each of which lies in a plane normal to the plane of the limb. A substantially cylindrical cam 6 is rotatably mounted between flanges 5 by means of a pin 7 which is eccentrically disposed in the cam and is journaled in bores 8 provided in the flanges 5. A rectangular aperture 9 is cut in the surfaces of limb 1, and cam 6 is so mounted above this aperture that when the cam is in the position shown in Figures 1 and 2 a part of the cam protrudes through the aperture and into slot 3. This protruding part of the cam has a portion cut away to provide a longitudinally extending substantially flat gripping region 10. A lever 11 is attached to the side of the cam opposite region 10 and this lever facilitates rotation of the cam. If the cam is turned through substantially 180° in the direction of arrow A, the gripping region 10 will lie above the limb 1 and the cam will no longer obstruct the slot. If necessary the cylinder comprising the cam may be replaced by two, spaced apart, coaxial cylinders or discs.

To attach the clamping member to a panel

12 a marginal portion of the panel is inserted into the slot 3, as shown in Figure 6. Lever 11 is then turned to cause the flat gripping region 10 of the cam to protrude through aperture 9 and to press upon the surface of the panel. The panel is thus gripped between region 10 and the inner surface of limb 2. The clamping or gripping action is assisted by the natural resilience of limbs 1 and 2. If there is little or no resilience in the limbs, limb 2 may be lined with cork, rubber or other resilient material to provide the necessary resilience. Any movement of the panel out of slot 3 when the clamp is closed tends to rotate the cam in a clockwise direction (referring to the view shown in Figure 1) thus increasing the gripping action of region 10.

As shown in Figure 1, a bore 13 is sunk in the stock portion 4 of the clamping member so that it may be pivotally connected in end-to-end relation with another member by means of a bolt, dowel pin or screw. Alternatively, the bore 13 may receive the shank of a footpiece (see Fig. 6), so that the clamping member may act as a free standing support for vertically disposed panels. If a fixed support is required the footpiece 14 may be replaced by a screw or bolt. By inserting a dowel screw in bore 13 two clamps may be rigidly connected together in end-to-end relation.

Referring to Figures 3 and 4, a clamping device comprises two clamping members pivotally connected together in end-to-end relation. As seen more clearly in Figure 4, the stock portion 4 of each clamp is provided with two laterally extending knuckles 15 which interfit with the knuckles of the other clamp. The knuckles are cylindrically bored in a direction parallel to the axis of cam 6 and a pintle 16 is inserted through the bores to pivotally connect the clamps together. A clamping device of this kind may advantageously be used for the quick assembly of panels to each other with freedom of relative hinging movement, or for mounting such panels on a frame or stand. The panels may be readily released from the device when desired, merely by turning levers 11 through a semi-circle. If desired, one of the clamping members may have slot 3 disposed in a plane normal to the plane of the slot of the other clamp i.e. normal to the plane of the axis of the pintle.

In the construction shown in Figure 5 a plurality of clamping members are stacked one above the other and are pivotally connected by a common pintle 16. In this construction the clamping members may have knuckles 15 as shown in Figure 4, or may simply be provided with a cylindrical bore in the stock portion 4 through which the pintle may be inserted. In this way any number of clamping members may be pivot-

ally connected together which gives great versatility in the relative positioning of panels.

The clamping members may be made of metal, wood or plastics material. In order that the clamping members may accommodate panels of different thicknesses inserts 17 (see Figure 5) may be inserted between a surface of the panel and the inner surface of limb 2. The inserts 12 may be of cork or some other moderately resilient material. The inner surface of limb 2 may be knurled or otherwise roughened to increase friction between the surface of the limb and the surface of the panel. Preferably, the end of lever 11 is bevelled, as shown in Figure 5, to facilitate the lifting of the lever when it is in the position shown in Figure 1.

Clamping devices according to the invention may be used in the erection of stands and the like for exhibition purposes and for the connection of partitions for space division. They may also be used for the mounting of lights and other fitments and for the connection together of building elements in constructional toys.

#### WHAT I CLAIM IS:—

1. A clamping device comprising two clamping members each comprising two opposed limbs connected together at one end thereof by a stock portion and spaced apart to define a slot into which an article to be clamped may be inserted, a cam or eccentric rotatably mounted in one limb and adapted when the clamp is in a closed position to protrude into the slot to grip the article to be clamped, and wherein the two clamping members are pivotally connected together at the stock portions thereof.

2. A clamping device according to Claim 1 wherein the two clamping members are pivoted about a pintle having its axis parallel to the axis of rotation of each cam or eccentric.

3. A clamping device according to Claim 2, wherein the pintle is hollow such that a plurality of clamping devices and members may be pivotally connected together in stacked arrangement by means of a common pin inserted through the hollow pintles.

4. A clamping device according to Claim 1, wherein the two clamping members are

pivoted about a dowel pin, bolt or screw having its longitudinal axis arranged perpendicular to the pivoted axis of each cam or eccentric.

5. A clamping device according to any one of the preceding Claims, wherein an acting face or edge of each cam or eccentric has a gripping region which is furthest from the axis of rotation of the cam or eccentric, and the cam or eccentric is rotatable from a clamping position in which the gripping region protrudes into the slot to an open position where the gripping region is retracted from the slot, without the cam or eccentric passing overcenter.

6. A clamping device according to any one of the preceding Claims wherein each cam comprises a substantially cylindrical block eccentrically journaled above an aperture in the face of the limb.

7. A clamping device according to Claim 6, wherein a lever is attached to the block on the side remote from the gripping region of the block.

8. A clamping device according to Claim 7 wherein the gripping region consists of an axially extending substantially flat surface formed on the face of the cylindrical block.

9. A clamping device as claimed in any of Claims 6 to 8 wherein each clamping member has a pair of parallel flanges disposed and in spaced apart relation to each side of the aperture and extending outwardly from the limb, said flanges being normal to the plane of the slot and having the cylindrical block journaled therebetween.

10. A clamp according to either of the preceding claims, wherein the face of the limb opposite the cam or eccentric is lined with a resilient material.

11. A clamping device according to any of Claims 1 to 3, and Claims 5 to 10 when dependent upon Claims 1 to 3, wherein the stock portions of the clamping members are provided with laterally extending knuckles which interengage in hinged relation.

12. A clamping device substantially as hereinbefore described with reference to Figures 3, 4 and 5 of the accompanying drawings.

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